

1. (Twice Amended) An apparatus for producing simultaneously a plurality of spatially separated images from a plurality of object planes, said apparatus comprising:

an optical system arranged to produce an image associated with a first focus condition;

C1 a diffraction grating arranged to produce, in concert with the optical system, images associated with each diffraction order; and

means for detecting the images, wherein the optical system, diffraction grating and detecting means are located on an optical axis and the diffraction grating is located in a suitable grating plane and the diffraction grating is distorted according to a quadratic function so as to cause the images to be formed under various focus conditions from a plurality of different object planes and said images spatially separated in a direction having a non-zero component perpendicular to the optical axis.

C2 15/3. (Twice Amended) An apparatus for producing simultaneously a plurality of spatially separated images from a plurality of object planes, said apparatus comprising:

an optical system arranged to produce an image associated with a first focus condition;

a diffraction grating arranged to produce, in concert with the optical system, images associated with each diffraction order and

means for detecting the images, wherein the optical system, diffraction grating and detecting means are located on an optical axis and the diffraction grating is located in a suitable grating plane and is distorted substantially according to a quadratic function so as

C2
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to cause the images to be formed under various focus conditions and adapted for forming images on a plurality of image planes, from said plurality of object planes.

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14. (Amended) The apparatus of claim 13 where at least one of the object planes contains a source of illumination which is used to illuminate the image planes.

C3
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17 15. (Amended) An apparatus for producing simultaneously a plurality of spatially separated images from an object field comprising:

an optical system arranged to produce an image associated with a first focus condition;

a diffraction grating arranged to produce, in concert with the optical system, images associated with each diffraction order and

means for detecting the images, wherein the optical system, diffraction grating and detecting means are located on an optical axis and the diffraction grating is located in a suitable grating plane and the diffraction grating is distorted according to a quadratic function so as to cause the images to be formed under various focus conditions and said images spatially separated in a direction having a non-zero component perpendicular to the optical axis, adapted for producing substantially in focus images in a common image plane, from a plurality of object planes.

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19. (Twice Amended) An apparatus for producing simultaneously a plurality of spatially separated images from an object field comprising:

an optical system arranged to produce an image associated with a first focus condition;

a diffraction grating arranged to produce, in concert with the optical system, images associated with each diffraction order; and

means for detecting the images, wherein the optical system, diffraction grating and detecting means are located on an optical axis and the diffraction grating is located in a suitable grating plane and is distorted substantially according to a quadratic function so as to cause the images to be formed under various focus conditions and further including a dispersive system for introducing an offset to an input beam of radiation, said offset being perpendicular to the optical axis and proportional to the wavelength of the input radiation, whilst leaving the beams at each wavelength following parallel paths.

¹²
1-20. (Amended) A wavefront analyser including an apparatus for producing simultaneously a plurality of spatially separated images from a plurality of object fields according to claim 1.

¹³
13-21. (Amended) A passage ranging device including an apparatus for producing simultaneously a plurality of spatially separated images from a plurality of object fields according to claim 1.